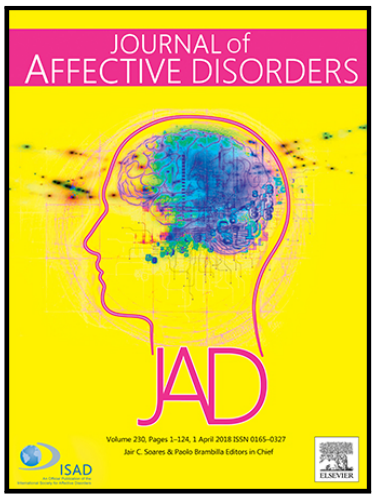

Prevalence of anxiety and depression symptoms, and association with epidemic-related factors during the epidemic period of COVID-19 among 123,768 workers in China: a large cross-sectional study

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Highlights

- The prevalence of anxiety and depression symptoms was 3.4% and 22.8% among workers during the COVID-19 epidemic in China.
- Epidemic-related factors especially having confirmed cases in the community and having confirmed friends were associated with the higher risk of anxiety and depression symptoms.
- Major traditional risk factors, such as general or poor health status and always drinking alcohol, were found still to be the dominant factors associating with the increased risk of anxiety and depression symptoms.
- Approximately 67.3% and 26.8% of workers reported demand for psychological education and interventions, respectively.

Prevalence of anxiety and depression symptoms, and association with epidemic-related factors during the epidemic period of COVID-19 among 123,768 workers in China: a large cross-sectional study

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Abstract

Background: COVID-19 has gained intense attention globally. However, little is known about the COVID-19-ralated mental health status among workers.

Methods: The cross-sectional online survey with 123,768 workers was conducted from February 2, 2020 to February 7, 2020 on a mega-size labor-intensive factory in Shenzhen, China. Oral consent was obtained prior to the questionnaire survey. The information collected in the survey included demographic characteristics, psychological symptoms, COVID-19-related information, and demands for psychological education and interventions. Symptoms of anxiety and depression were measured by the Zung's Self-Rating Anxiety Scale and Self-Rating Depression Scale. Logistic regression models were performed to determine the association between related factors and mental health status.

Results: The prevalence of anxiety and depression symptoms was 3.4% and 22.8%, respectively. The dominant epidemic-related factors were having confirmed cases in the community (odds ratio [OR], 2.75, 95% CI, 2.37–3.19) and having confirmed friends (OR, 2.44; 95% CI, 1.69–3.52) for the increased risk of anxiety and depression symptoms, respectively. Nevertheless, major traditional risk factors such as general or poor health status and always drinking alcohol were still the dominant factors associated with the increased risk of anxiety and depression symptoms. Overall, 67.3%

and 26.8% workers reported desire for psychological education and interventions, respectively.

Limitations: All assessments were self-reported, resulting in a risk of method bias.

Conclusions: Our findings show a relatively low prevalence of anxiety symptoms, a relatively high prevalence of depression symptoms, and urgent demand for psychological education and interventions among workers during the COVID-19 outbreak.

Keywords: Coronavirus disease 2019; anxiety symptoms; depression symptoms; epidemic-related factors; workers

1.Introduction

In December 2019, the Chinese city of Wuhan reported an outbreak of acute respiratory illness (Lu, Stratton, & Tang, 2020), which was subsequently named Coronavirus Disease 2019 (COVID-19) by the World Health Organization (WHO). Cases spread not only to other cities in China, but also internationally as well (Holshue et al., 2020; Hui et al., 2020; Phan et al., 2020; Wang, Horby, Hayden, & Gao, 2020; WHO, February 9, 2020). On January 30, 2020, the WHO declared the event to be a public health emergency of international concern (WHO, Jan 30, 2020). To control the spread of COVID-19, the Chinese government ordered all companies not to resume operations until February 10, 2020 (General Office of the State Council, Jan 27, 2020). Over 80 million people returned to work near or after February 10,

2020, triggering a return trip peak for workers. Due to a low level of education, a relatively weak awareness of infectious diseases prevention and control, a high-intensity workload, and high crowd densities after returning to work, workers were high–risk populations for the spread and rebound of the epidemic. Thus, government departments needed to pay more attention to the workers for prevention and control of the COVID-19 epidemic.

Previous studies have shown that a large-scale epidemic disease not only seriously endangers people's life and property safety but also has a negative impact on mental health, such as anxiety, depression, and other negative emotions, and can cause a psychological crisis. For instance, the public became more pessimistic in their life after experiencing the epidemic of the severe acute respiratory syndrome (SARS) in 2003 (Lau, Yang, Tsui, Pang, & Wing, 2006). Other previous studies on large–scale epidemics also showed that the probability of group panic in an outbreak is much higher than the risk of contracting the disease (Betancourt et al., 2016; Kelly et al., 2019; Leung et al., 2005; Mohammed et al., 2015; Reardon, 2015; Shultz, Baingana, & Neria, 2015). Therefore, the National Health Commission issued the "Guiding Principles for Emergency Psychological Crisis Intervention for the Pneumonia Epidemic of New Coronavirus Infection" (National Health Commission of China, Jan 26, 2020.). Emerging studies on the relationship between COVID-19 and mental health status have been published (Huang & Zhao, 2020; Ma et al., 2020; Nie et al., 2020; H. Wang et al., 2020; Xiao et al., 2020). However, the available studies mainly focused on the general population, medical workers, and infected patients. Currently,

there is no known information about the mental health status of factory workers during the peak of the COVID-19 epidemic.

Therefore, in a large cross–sectional online study, we investigated the prevalence of anxiety and depression symptoms, as well as related factors, among factory workers during the epidemic period of COVID-19. Moreover, we also explored the demand for psychological education and interventions.

2.Methods

2.1 Study design and setting

The data used in the present study were derived from a cross-sectional online survey based on a mega-size labor-intensive factory in Shenzhen, Guangdong Province, China, with 180,000 employees from various provinces across the country. The survey was divided into seven modules, including demographic characteristics, lifestyle factors, epidemic-related factors, traffic information, knowledge, attitude, and practice (KAP), and demand for psychological education and interventions during the period of epidemic.

The present survey was conducted online using an electronic questionnaire. Oral consent was obtained from the respondents prior to beginning the survey. The survey was conducted from February 2, 2020 to February 7, 2020. Overall, 142,584 respondents completed the survey, yielding a response rate of 79.2%. After excluding respondents who filled out questionnaires with the same IP address (n = 15,035) and those who completed the survey in less than 510 seconds (n = 3781), 123,768 respondents were ultimately included in the analyses, yielding an effective response

rate of 68.8% (Figure 1). The distribution of the respondents by province or region can be found in Table S1 in the Supplement. The protocol of this study was approved by the Biomedical Ethics Committee of Southern Medical University.

2.2 Data collection

Data were collected online via a large free questionnaire platform — the Chinese survey website Wenjuanxing (https://www.wjx.cn/). Workers were asked to complete a self-administered questionnaire, which took approximately 10–15 minutes. To avoid repetition, questionnaires submitted from the same IP address as a previously submitted questionnaire were not accepted.

2.3 Survey tools

Anxiety and depression symptoms were assessed by the wildly used Zung's Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) for testing mental health status (Zung, 1971; Zung, Richards, & Short, 1965). The SAS and SDS consist of 20 self–reporting items about anxiety and depression symptoms, respectively. Some of the items were worded symptomatically positive and rated on a 4–1 scale (a little of the time, some of the time, good part of the time, and most of the time), while others were symptomatically negative and rated on a 1–4 scale (a little of the time, some of the time, good part of the time, and most of the time). The tools used in this study are listed in the Supplement. A standardized scoring algorithm was used to determine anxiety and depression symptoms, with a total score of 20–80. Anxiety symptoms were identified if the SAS score was ≥50, while score of 50–59 was “mild”, 60–69 was “moderate”, and ≥70 was “severe”. Similarly, depression

symptoms were identified if the SDS score was ≥ 53, while score of 53–62 was "mild", 63–72 was "moderate", and ≥ 73 was "severe".

2.4 Definitions of subgroups

Two variable sets were considered to be stratification variables, including epidemic-related variables and demographic variables. The epidemic-related variables were defined as follows: cumulative number of confirmed cases in the provinces (1–499, 500–999,1000–9999, and ≥10,000); have infected cases in the community or not (no case, suspected cases, confirmed cases, and not clear); having infected relatives or not (no case, suspected cases, confirmed cases, and not clear); having infected friends or not (no case, suspected cases, confirmed cases, and not clear); having passed by, traveled to, or having lived in Hubei province in the last two weeks (none, having passed by Hubei province, having traveled to Hubei province, and having lived in Hubei province). The demographic variables were defined as follows: sex (male or female), age groups (≤ 25 years, 26–35 years, or ≥ 36 years), education levels (≤ 6 years, 7–9 years, 10–12 years, or ≥13 years), ethnicities (Han or minorities), provinces or regions (Hubei province or others), residence (urban or rural), marital status (married or not married), health status (very healthy, well, or general or poor), smoking status (hardly ever, sometimes, or always), and alcohol consumption (hardly ever, sometimes, or always), positions (general worker, line supervisor, group leader, or manager), and seniority (0–6 months, 7–12 months, 13–24 months, or >24months).

2.5 Assessment of demand of psychological education and interventions

The “demand for psychological education” was assessed with the following question: “Do you have a demand for psychological education?” with responses of “yes” or “no”. If someone answered yes, they would be asked “What kind of knowledge for psychological education do you need?” with responses of “the common symptom of COVID-19”, “ways to alleviate the psychological effects”, “ways to seek professional psychological help”, or “others”. The “demand for psychological interventions” was assessed with the following question: “Do you have a demand for receiving psychological interventions?” with responses of “very”, “moderate”, “a little” or “no”. If someone answered very, moderate, or a little, they would be asked “What kind of psychological interventions do you need?” with responses of “counselling”, “promotion of mental health knowledge”, “mental health training course”, “psychological assessment”, “group building and other development activities”, “psychological salon”, or “others”. Meanwhile, they also would be asked “When are you willing to receive the psychological interventions?” with responses of “morning meeting”, “after work”, “at weekend”, “lunchtime”, “dinner time”, and “others”.

2.6 Statistical analysis

All statistical analyses were performed using SPSS version 25; all tests were 2-sided, and statistical significance was set at $p < 0.05$. The mean and standard deviation (SD) (continuous variables) or number and percentage (categorical variables) were used to describe the characteristics of the respondents. Bivariable logistic regression analyses were applied to test the associations of potential explanatory variables including demographic variables and epidemic-related variables with anxiety and depression

symptoms. To measure the associations of epidemic-related variables with anxiety and depression symptoms, multivariable logistic regression models were used to adjust for demographic variables including sex, age group, education level, residence, marital status, health status, smoking status, alcohol consumption, positions, and seniority.

3.Results

3.1 Demographic characteristics

This analysis included 123,768 (mean [SD] age: 30.3 [6.4] years) respondents, of whom 87,330 (70.6%) were male and 36,438 (29.4%) were female (Table 1). A majority (70.3%) of respondents completed high school, 89.1% were Han nationality, 8.0% lived in Hubei province during the survey, 55.3% lived in urban, and 40.4% were married. In terms of health status, 74.7% of workers reported "very healthy", 23.3% reported "well", and 2.1% reported "general or poor". About 73.5% of respondents hardly ever smoke, and 90.3% hardly ever drink. In addition, about 76.4% of the respondents were general workers, 6.0% were line supervisors, 4.9% were group leaders, and 12.8% were managers. Respondents with more than 24 months of service accounted for 50.6%. Compared to female respondents, male respondents were more likely to have senior positions and lived in the province with a less cumulative number of confirmed cases (Table 1).

3.2 Bivariable analysis: association of epidemic-related factors and major demographic factors with anxiety and depression symptoms

Overall, 3.4% of respondents reported anxiety symptoms, ranging from 2.9% mild to 0.3% moderate and 0.2% severe; while 22.8% of respondents reported depression

symptoms, ranging from 9.6% mild to 13.1% moderate and 0.1% severe. Table 2 describes the results of the bivariate analysis. According to the influence on the risk of anxiety and depression symptoms, the epidemic-related exposures ranked as follows: having infected friends, having infected relatives, having infected cases in community, increased cumulative number of infected cases in provinces, and having lived in Hubei province in the last two weeks. Interestingly, the prevalence of anxiety and depression symptoms was significantly lower among respondents who recently lived in Hubei province compared with those who lived in other provinces or regions.

Associations of demographic characteristics with anxiety and depression symptoms are shown in Table 2 and Table S2. Of note, health status and alcohol consumption were the most dominant factors influencing the risk of anxiety and depression symptoms.

3.3 Multivariable analysis: association of epidemic-related factors and major demographic factors with anxiety and depression symptoms

After adjusting for the demographic covariates, the epidemic-related factors with the highest to lowest risk of anxiety symptoms ranked as follows: having infected cases in the community, having infected friends, having infected relatives, and the increased cumulative number of infected cases in the provinces, and having passed by, traveled to, or lived in Hubei province in the last two weeks. The most dominant factors influencing the risk of depression symptoms were having infected relatives and infected friends (Table 3). For instance, compared with respondents with no infected friends, the adjusted odds ratios were 2.72 (95% CI, 1.96–3.78) for anxiety symptoms

and 1.60 (95% CI, 1.25–2.05) for depression symptoms in those with suspected friends, and 1.93 (95% CI, 1.12–3.32) for anxiety symptoms and 2.44 (95% CI, 1.69–3.52) for depression symptoms in those with confirmed friends. Interestingly, the prevalence of anxiety (OR, 0.80; 95% CI, 0.70–0.90) and depression (OR, 0.81; 95% CI, 0.76–0.85) symptoms were significantly lower among respondents who recently lived in Hubei province compared with those who lived in other provinces or regions.

Association of demographic characteristics with anxiety and depression symptoms was shown in Table 3 and Table S3. Of note, health status and alcohol consumption were remained the dominant factors influencing the risk of anxiety and depression symptoms. Respondents with general or poor health status were more likely to have anxiety (OR, 6.34; 95% CI, 5.64–7.13) and depression (OR, 2.15; 95% CI, 1.98–2.35) symptoms. The prevalence of anxiety and depression symptoms among respondents who always drank alcohol was almost triple that of those who hardly ever drank alcohol.

3.4 The demands for psychological education and interventions

As shown in Table 4, the prevalence of respondents reporting a demand for psychological education (overall rate: 67.3%) was higher in those with anxiety (78.4% vs 66.9%) and depression symptoms (69.0% vs 66.7%) than in those without. For all respondents, the most needed psychological knowledge was the common symptom of COVID-19, followed by the methods to alleviate the epidemic's psychological effects.

The prevalence of respondents reporting a demand of psychological interventions (overall rate: 26.8%) was higher in those with anxiety (63.5% vs 25.5%)

and depression symptoms (38.2% vs 23.4%) than in those without. For respondents with anxiety or depression symptoms, the most needed psychological intervention was counselling, followed by promotion of mental health knowledge. Morning meeting followed by the period after work were the two most desired time to receive psychological interventions. Interestingly, the prevalence of respondents who lived in Hubei province reporting the demands of psychological knowledge (63.9% vs. 67.6%) and interventions (22.8% vs. 27.1%) was slightly below that of those who lived in the other provinces or regions (Table S4).

4.Discussion

The aim of the present study was to investigate the prevalence and the related factors of anxiety and depression symptoms, and the demands for psychological education and interventions among workers during the epidemic period of COVID-19 in China. Approximately 3.4% and 22.8% of respondents exhibited symptoms of anxiety and depression, respectively. We also revealed the urgent demands for psychological education (67.3%) and interventions (26.8%) among workers. Moreover, after adjustment for the demographic covariates, epidemic-related factors especially having confirmed cases in the community and having confirmed friends were found to be significantly associated with the higher risk of anxiety and depression symptoms, respectively, but traditional risk factors such as health status and alcohol consumption remained the dominant factors. Interestingly, respondents who recently lived in Hubei province were more likely to report a lower risk of anxiety and depression symptoms, and slightly lower demands for psychological education and interventions.

Compared with previous studies performed on the general population in China before the outbreak, the prevalence of anxiety symptoms in this study was not significantly different, while the prevalence of depression symptoms was roughly 4–5 times or higher (Y. Huang et al., 2019; Phillips et al., 2009). The prevalence of anxiety symptoms in the present study was lower than previous studies on the general population which reported 28.8% – 35.1%. The prevalence of depression symptoms in the present study from February 2, 2020 to February 7, 2020 was consistent with the results of an epidemiological study that was conducted in early February 2020 among the general population in China, which indicated that the overall prevalence of depressive symptoms was 20.1% (Huang & Zhao, 2020). An earlier survey that was performed in late January 2020 found that 16.5% respondents reported moderate to severe depressive symptom (C. Wang, R. Pan, et al., 2020). Another later survey that was performed in early March 2020 reported that 27.9% of respondents had depression symptoms (Shi et al., 2020). These findings indicated that depression symptoms occurred among the workers during the epidemic period of COVID-19 in China and highlighted the importance of preventing and treating mental health problems of workers. The present study was conducted from February 2, 2020 to February 7, 2020, when these workers suspended their work because of the publication of the policy for postponing the resumption of work (General Office of the State Council, Jan 27, 2020). Soon afterwards they came back to work on February 10, 2020. Therefore, health authorities and factories should pay more attention on the psychological health of workers for improving mental health in

workers after returning to work, which potentially improves productivity.

This study demonstrated a statistically significant association between epidemic-related exposure and a higher risk of anxiety and depression symptoms. Nevertheless, our findings further indicated that major traditional risk factors, such as physical health and alcohol consumption, were still the dominant factors influencing the risk of anxiety and depression symptoms, which was also reported in the previous studies. A study on 3031 migrant workers from 10 manufacturing factories in Shenzhen, China, showed that respondents with physical illness in the past two weeks were more likely to report poor mental health (OR,1.72; 95% CI,1.43–2.05) (Zhong et al., 2018). Another study demonstrated that consuming an average of seven or more alcoholic drinks per day significantly increased the risk of depression compared with consuming an average of one or two alcoholic drinks (OR, 2.21; 95%CI, 1.02–4.40) (Almeida, Hankey, Yeap, Golledge, & Flicker, 2014). However, the association between alcohol consumption and mental health status might also be explained by "reverse causality", in which increased motivation of frequently drinking would occur in the anxiety and depression symptoms (Cyders & Smith, 2008; Dir, Karyadi, & Cyders, 2013).

This study revealed an urgent need for psychological knowledge and interventions among workers. Of note, we found that respondents with anxiety symptoms were more likely to report the demands of psychological interventions (63.5% vs 25.5%), suggesting that health authorities and factories should pay more attention to those populations. Moreover, our findings also have several important,

immediate implications for health authorities and factories. First, our findings suggested that the common symptom of COVID-19 was the most needed psychological knowledge. Second, counseling and promotion of mental health knowledge ranked as the top two demands for psychological interventions. Third, morning meeting followed by the period after work were the two most desired time to receive psychological interventions. In summary, we have identified the most desired psychological knowledge, interventions, and times to receive them, which could help health authorities to formulate targeted policies for workers to improve their mental health status.

Interestingly, we found that respondents who recently lived in Hubei province (the hardest–hit province of the COVID-19 epidemic) had a lower risk of anxiety and depression symptoms, and slightly lower demands for psychological education and interventions during the epidemic period of COVID-19. The reason for this finding may be family support (Bhugra & van Ommeren, 2006). People in Hubei province delayed returning to work due to the epidemic, and they were advised to avoid going to public places. Therefore, family members were likely to spend more time together with each other.

To our knowledge, the present study is the largest cross-sectional study to investigate the prevalence of anxiety and depression symptoms, as well as associations with epidemic-related factors during the epidemic period of COVID-19 in China. The present study not only revealed the mental health status of workers during the epidemic period of COVID-19, but also provided a reference for the mental

health of workers in labor–intensive factories in China. The strengths of our study include the large sample size from various provinces or regions across the country, special population groups, a short-cycle survey, and careful measurement of epidemic-related factors and demographic covariates.

Nevertheless, several limitations of this study should be taken into account when interpreting the results. First, due to the urgency of the time and the limitation of current resources, it is not possible to carry out sampling surveys in all provinces of the country. However, the 123,768 respondents completing the questionnaire covered almost all provinces and regions in China, and some subjects from overseas, which improved the representativeness of the population and reduced the possibility of sampling error. Second, data were collected online via the Chinese survey website Wenjuanxing. There are cases whose questionnaires were filled out by others instead of by the respondents themselves. To reduce the error caused by this causes, we excluded questionnaires with the same IP address. Third, the measurement methods for anxiety and depression symptoms as well as demographic covariates, and epidemic-related factors relied on self–reporting, and therefore raised the possibility of common method bias. Finally, the present study used Zung's Self-Rating scales method. The results of anxiety and depression might lack comparability with clinical diagnostic measurements of anxiety and depression.

5.Conclusions

In conclusion, our survey found a relatively low prevalence of anxiety symptoms, a relatively high prevalence of depression symptoms, and the urgent demands for

psychological knowledge and interventions among Chinese workers. Epidemic-related factors were significantly associated with the higher risk of anxiety and depression symptoms, but traditional risk factors, such as health status and alcohol consumption, were still the dominant factors. In addition, we also identified the most desired psychological knowledge, interventions, and times to receive them, which could help health authorities and factories to formulate targeted policies to increase workers' adherence to knowledge and interventions, and thus improve workers' mental health status.

Author statement

Author contributions

XRZ, QMH, XMW, and XC contributed to the statistical analyses and writing the manuscript. CM and XFY directed the study. ZHL, ZHW, WFZ, DL, DS, PLC, and WQS contributed to the data cleaning. CM, and XBW contributed to the analysis or interpretation of the data. All authors critically reviewed the manuscript for important intellectual content. CM is the study guarantor. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Conflicts of interest

All the authors declare no conflicts of interest.

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Figure 1. Flowchart of respondent' selection process.

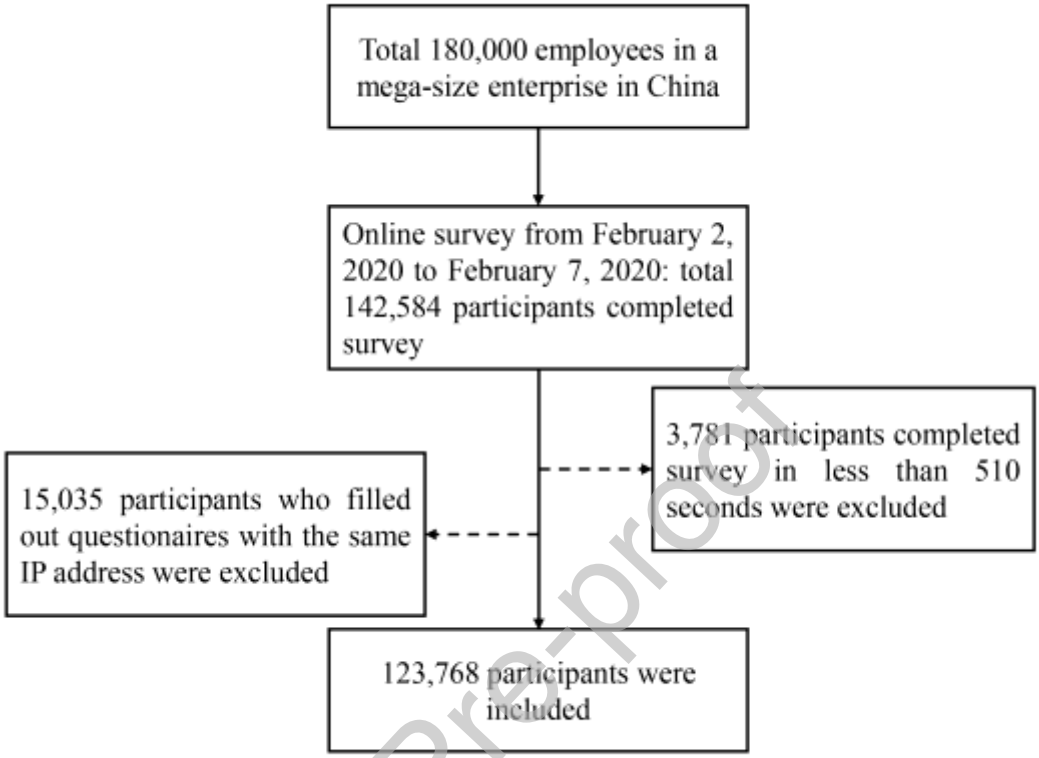

Table 1. Demographic characteristics of respondents

Characteristics	Total, No. (%) (N = 123,768)	No. (%)		Pearson χ^2	*P* Value
		Male (N = 87,330)	Female (N = 36,438)		
Age, mean (SD), years	30.3 (6.4)	30.5 (6.4)	30.1 (6.6)	362.008	<0.001
Education levels, years				6.109	0.106
≤6 Years	1065 (0.9)	766 (0.9)	299 (0.8)		
7–9 Years	35,682 (28.8)	25,108 (28.8)	10,574 (29.0)		
10–12 Years	48,522 (39.2)	34,128 (39.1)	14,394 (39.5)		
≥13Years	38,499 (31.1)	27,328 (31.3)	11,171 (30.7)		
Ethnicities				1.129	0.288
Han	110,243 (89.1)	77,840 (89.1)	32,403 (88.9)		
Minorities	13,525 (10.9)	9490 (10.9)	4035 (11.1)		
Provinces or Regions				2.275	0.131
Hubei	9924 (8.0)	7068 (8.1)	2856 (7.8)		
Others	113,844 (92.0)	80,262 (91.9)	33,582 (92.2)		
Residence				0.093	0.761
Urban	68,505 (55.3)	48,361 (55.4)	20,144 (55.3)		
Rural	55,263 (44.7)	38,969 (44.6)	16,294 (44.7)		
Marital status				0.051	0.822
Married	49,983 (40.4)	35,250 (40.4)	14,733 (40.4)		
Not married	73,785 (59.6)	52,080 (59.6)	21,705 (59.6)		
Health status				1.641	0.440
Very healthy	92,396 (74.7)	65,147 (74.6)	27,249 (74.8)		

Well	28,832 (23.3)	20,363 (23.3)	8469 (23.2)		
General or poor	2540 (2.1)	1820 (2.1)	720 (2.0)		
Smoking status				0.933	0.627
Hardly ever	91,008 (73.5)	64,282 (73.6)	26,726 (73.3)		
Sometimes	892 (7.2)	6286 (7.2)	2640 (7.2)		
Always	23,834 (19.3)	16,762 (19.2)	7072 (19.4)		
Alcohol consumption				2.830	0.243
Hardly ever	111,717 (90.3)	78,889 (90.3)	32,828 (90.1)		
Sometimes	11,032 (8.9)	7742 (8.9)	3290 (9.0)		
Always	1019 (0.8)	699 (0.8)	320 (0.9)		
Positions				9.342	0.025
General worker	94,523 (76.4)	66,610 (76.3)	27,913 (76.6)		
Line supervisor	7455 (6.0)	5249 (6.0)	2206 (6.1)		
Group leader	6008 (4.9)	4187 (4,8)	1821 (5.0)		
Manager	15,782 (12.8)	11,284 (12.9)	4498 (12.3)		
Seniority, months				0.392	0.942
0–6 months	29,253 (23.6)	20,680 (23.7)	8573 (23.5)		
7–12 months	16,317 (13.2)	11,516 (13.2)	4801(13.2)		
13–24 months	15,560 (12.6)	10,979 (12.6)	4581(12.6)		

> 24months	62,638 (50.6)	44,155 (50.6)	18,483(50.7)		
Cumulative number of confirmed cases in the provinces				70.549	<0.001
1–499	26,860 (21.7)	19,420 (22.2)	7740 (20.4)		
500–999	84,283 (68.1)	59,185 (67.8)	25,098 (68.9)		
1000–9999	2701 (2.2)	1945 (2.2)	756 (2.1)		
≥10,000	9924 (8.0)	6780 (7.8)	3144 (8.6)		

CI, confidence interval.

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Table 2. Bivariate analysis：association of epidemic-related factors and major demographic factors with anxiety and depression symptoms (N = 123,768)

Characteristics	Anxiety Symptoms		Depression Symptoms	
	No. (%) [95% CI]	Crude OR (95% CI)	No. (%) [95% CI]	Crude OR (95% CI)
Total	4196 (3.4) [3.3–3.5]		28,266(22.8) [22.6–23.1]	
Epidemic-related factors				
Cumulative number of confirmed cases in the provinces				
1–499	735 (2.7) [2.5–2.9]	1 [Reference]	4401 (16.4) [15.9–16.8]	1 [Reference]
500–999	2868 (3.4) [3.3–3.5]	1.25 (1.15–1.36)	20,152 (23.9) [23.6–24.2]	1.60 (1.55–1.66)
1000–9999	120 (4.4) [3.7–5.2]	1.65 (1.36–2.01)	777 (28.8) [27.1–30.5]	2.06 (1.89–2.25)
≥10,000	473 (4.8) [4.3–5.2]	1.78 (1.58–2.00)	2936 (29.6) [28.7–30.5]	2.14 (2.03–2.26)
Have infected cases in the community or not				
No case	1859 (2.2) [2.1–2.3]	1 [Reference]	16,040 (19.4) [19.1–19.6]	1 [Reference]
Suspected cases	240 (8.4) [7.4–9.4]	3.99 (3.47–4.59)	823 (28.8) [27.1–30.4]	1.68 (1.55–1.83)
Confirmed cases	268 (10.2) [9.0–11.3]	4.94 (4.32–5.65)	851 (32.3) [30.5–34.1]	1.99 (1.83–2.16)
Not clear	1829 (5.2) [4.9–5.4]	2.37 (2.22–2.54)	10,552 (29.8) [29.3–30.3]	1.77 (1.72–1.82)
Have infected relatives or not				
No case	3313 (2.8) [2.7–2.9]	1 [Reference]	24,613 (21.1) [20.8–21.3]	1 [Reference]
Suspected cases	35 (18.4) [12.9–24.0]	7.74 (5.35–11.18)	87 (45.8) [38.6–52.9]	3.17 (2.38–4.21)
Confirmed cases	18 (13.6) [7.7–19.6]	5.41 (3.29–8.91)	71 (53.8) [45.2–62.4]	4.36 (3.10–6.14)
Not clear	830 (12.6) [11.8–13.4]	4.92 (4.54–5.33)	3495 (52.9) [51.7–54.1]	4.20 (4.00–4.42)

Have infected friends or not				
No case	2285 (2.4) [2.3–2.5]	1 [Reference]	19,428 (20.7) [20.4–20.9]	1 [Reference]
Suspected cases	69 (20.9) [16.5–25.3]	10.62 (8.12–13.89)	146 (44.2) [38.9–49.6]	3.05 (2.45–3.79)
Confirmed cases	23 (15.0) [9.3–20.8]	7.10 (4.55–11.09)	82 (53.6) [45.6–61.6]	4.44 (3.23–6.10)
Not clear	1819 (6.2) [5.9–6.5]	2.66 (2.50–2.84)	8610 (29.4) [28.9–30.0]	1.60 (1.56–1.65)
Have passed by，traveled to, or lived in Hubei province in the last two weeks				
None	3757 (3.4) [3.3–3.5]	1 [Reference]	25,769 (23.1) [22.9–23.3]	1 [Reference]
Have passed by Hubei province	101 (5.7) [4.6–6.8]	1.73 (1.42–2.13)	222 (36.9) [33.1–40.8]	0.83 (0.73–0.93)
Have traveled to Hubei province	11 (8.9) [3.8–14.1]	2.82 (1.52–5.24)	243 (29.1) [26.0–32.2]	1.31 (0.89–1.95)
Have lived in Hubei province[a]	327 (3.1) [2.8–3.5]	0.93 (0.83–1.05)	2032 (18.8) [18.1–19.6]	0.78 (0.74–0.82)
Major demographic factors[b]				
Health status				
Very healthy	2029 (2.2) [2.1–2.3]	1 [Reference]	19,858 (21.5) [21.2–21.8]	1 [Reference]
Well	1674 (5.8) [5.5–6.1]	2.75 (2.6–2.93)	7279 (25.2) [24.7–25.7]	1.23 (1.20–1.27)
General or poor	493 (19.4) [17.9–20.9]	10.73 (9.63–11.95)	1129 (44.4) [42.5–46.4]	2.92 (2.70–3.17)
Alcohol consumption				
Hardly ever	3502 (3.1) [3.0–3.2]	1 [Reference]	24,504 (21.9) [21.7–22.2]	1 [Reference]
Sometimes	573 (5.2) [4.8–5.6]	1.69 (1.55–1.85)	3241 (29.4) [28.5–30.2]	1.48 (1.42–1.55)
Always	121 (11.9) [9.9–13.9]	4.16 (3.43–5.05)	521 (51.1) [48.1–54.2]	3.72 (3.29–4.21)
Education levels, Years				
≤6 Years	90 (8.5) [6.8–10.1]	1 [Reference]	435 (40.8) [37.9–43.8]	1 [Reference]
7–9 Years	1209 (3.4) [3.2–3.6]	0.38 (0.30–0.48)	10,260 (28.8) [28.3–29.2]	0.59 (0.52–0.66)
10–12 Years	1471 (3.0) [2.9–3.2]	0.34 (0.27–0.42)	11,315 (23.3) [22.9–23.7]	0.44 (0.39–0.50)

	≥13Years	1426 (3.7) [3.5–3.9]	0.42 (0.33–0.52)	6256 (16.2) [15.9–16.6]	0.28 (0.25–0.32)
Positions					
	General worker	3348 (3.5) [3.4–3.7]	1 [Reference]	23,426 (24.8) [24.5–25.1]	1 [Reference]
	Line supervisor	205 (2.7) [2.4–3.1]	0.77 (0.67–0.89)	1746 (23.4) [22.5–24.4]	0.93 (0.88–0.98)
	Group leader	157 (2.6) [2.2–3.0]	0.73 (0.62–0.86)	1042 (17.3) [16.4–18.3]	0.64 (0.50–0.68)
	Manager	486 (3.1) [2.8–3.3]	0.87 (0.79–0.95)	2052 (13.0) [12.5–13.5]	0.45 (0.43–0.48)
Residence					
	Rural	2091 (3.8) [3.6–3.9]	1 [Reference]	13,432 (24.3) [23.9–24.7]	1 [Reference]
	Urban	2105 (3.1) [2.9–3.2]	0.81 (0.76–0.88)	14,834 (21.7) [21.3–22.0]	0.82 (0.84–0.88)

CI, confidence interval; OR, odds ratio.

[a]In general, the people who have lived in Hubei for the past two weeks were almost native of Hubei province.

[b]For demographic factors, only the top five are shown according to their positive influence on the risk of anxiety and depression symptoms.

Table 3. Multivariable analysis：association of epidemic-related factors and major demographic factors with anxiety and depression symptoms (N = 123,768)

Characteristics	Anxiety Symptoms		Depression Symptoms	
	No.	Adjusted OR (95% CI)	No.	Adjusted OR (95% CI)
Total	4196		28,266	
Epidemic-related factors				
Cumulative number of confirmed cases in the provinces				
1–499	735	1 [Reference]	4401	1 [Reference]
500–999	2868	1.21 (1.10–1.32)	20,152	1.44 (1.38–1.50)
1000–9999	120	1.49 (1.20–1.86)	777	1.68 (1.51–1.84)
≥10,000	473	1.83 (1.58–2.11)	2936	1.78 (1.67–1.90)
Have infected cases in the community or not				
No case	1859	1 [Reference]	16,040	1 [Reference]
Suspected cases	240	2.01 (1.72–2.35)	823	1.29 (1.18–1.41)
Confirmed cases	268	2.75 (2.37–3.19)	851	1.67 (1.53–1.83)
Not clear	1829	1.50 (1.39–1.63)	10 552	1.31 (1.27–1.36)
Have infected relatives or not				
No case	3313	1 [Reference]	24,613	1 [Reference]
Suspected cases	35	1.70 (1.09–2.64)	87	1.79 (1.30–2.47)

Confirmed cases	18	1.67 (0.92–3.04)	71	2.24(1.52–3.29)
Not clear	830	2.37 (2.14–2.61)	3495	2.99 (2.82–3.17)
Have infected friends or not				
No case	2285	1 [Reference]	19,428	1 [Reference]
Suspected cases	69	2.72 (1.96–3.78)	146	1.60 (1.25–2.05)
Confirmed cases	23	1.93 (1.12–3.32)	82	2.44 (1.69–3.52)
Not clear	1819	1.13 (1.21–1.42)	8610	1.02 (0.98–1.06)
Have passed by，traveled to, or lived in Hubei province in the last two weeks				
None	3757	1 [Reference]	25,769	1 [Reference]
Have passed by Hubei province	101	1.04 (0.83–1.29)	222	0.71 (0.63–0.81)
Have traveled to Hubei province	11	1.66 (0.83–3.30)	243	1.22 (0.79–1.89)
Have lived in Hubei province[a]	327	0.80 (0.70–0.90)	2032	0.81 (0.76–0.85)
Major demographic factors[b]				
Health status				
Very healthy	2029	1 [Reference]	19,858	1 [Reference]
Well	1674	2.33 (2.17–2.49)	7279	1.17 (1.13–1.21)
General or poor	493	6.34 (5.64–7.13)	1129	2.15 (1.98–2.35)
Alcohol consumption				
Hardly ever	3502	1 [Reference]	24,504	1 [Reference]
Sometimes	573	1.60 (1.45–1.77)	3241	1.41 (1.35–1.48)
Always	121	3.02 (2.44–3.75)	521	3.05 (2.67–3.49)

Education levels, years					
	≤6 Years	90	1 [Reference]	435	1 [Reference]
	7–9 Years	1209	0.43 (0.34–0.54)	10,260	0.62 (0.54–0.71)
	10–12 Years	1471	0.39 (0.31–0.50)	11,315	0.47 (0.41–0.53)
	≥13Years	1426	0.54 (0.42–0.68)	6256	0.35 (0.30–0.40)
Positions					
	General worker	3348	1 [Reference]	23,426	1 [Reference]
	Line supervisor	205	0.82 (0.71–0.95)	1746	0.99 (0.93–1.05)
	Group leader	157	0.74 (0.62–0.89)	1042	0.89 (0.82–0.96)
	Manager	486	0.87 (0.77–0.97)	2052	0.75 (0.71–0.79)
Residence					
	Rural	2091	1 [Reference]	13,432	1 [Reference]
	Urban	2105	0.84 (0.78–0.90)	14,834	0.87 (0.84–0.89)

CI, confidence interval; OR, odds ratio.

Adjusted covariates included sex, age groups, education levels, residence, marital status, health status, smoking status, alcohol consumption, position, and seniority.

[a]In general, the people who have lived in Hubei for the last two weeks were almost native of Hubei province.

[b]For demographic factors, only the top five are shown according to the positive influence on the risk of anxiety and depression symptoms.

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Table 4. The demands for psychological education and interventions according to anxiety and depression symptoms

	Total, No. (%) (N = 123,768)	Anxiety Symptoms, No. (%)			Depression Symptoms, No. (%)		
		No	Yes	*P* Value	No	Yes	*P* Value
Demand for psychological education				<0.001			<0.001
Yes	83,251 (67.3)	79,962 (66.9)	3289 (78.4)		63,742 (66.7)	19,509 (69.0)	
No	40,517 (32.7)	39,610 (33.1)	907 (21.6)		31,760 (33.3)	8757 (31.0)	
Knowledge for psychological education [a]				<0.001			<0.001
The common symptom of COVID-19	74,601 (41.4)	71,937 (41.5)	2667 (36.9)		58,294 (42.0)	16,307 (39.2)	
Ways to alleviate the psychological effects	54,384 (30.1)	51,946 (30.0)	2438 (33.7)		41,162 (29.7)	13,222 (31.8)	
Ways to seek professional psychological help	49,751 (27.6)	47,700 (27.5)	2051 (28.4)		38,155 (27.5)	11,596 (27.9)	
Others	1661 (0.9)	1586(0.9)	75 (1.0)		1153 (0.8)	508 (1.2)	
Demand for psychological Interventions				<0.001			<0.001
Very	3763 (3.0)	3200 (2.7)	563 (13.4)		1617 (1.7)	2146 (7.6)	
Moderate	8232 (6.7)	7371 (6.2)	861 (20.5)		5083 (5.3)	3149 (11.1)	

A little	21,120 (17.1)	19,881 (16.6)	1239 (29.5)		15,613 (16.3)	5507 (19.5)	
No	90,653 (73.2)	89,120 (74.5)	1533 (36.5)		73,189 (76.6)	17,464 (61.8)	
Psychological interventions[a]				<0.001			
Counselling	19,289(19.9)	17,563 (19.7)	1726 (22.3)		12,500 (19.1)	6789 (21.6)	
Promotion of mental health knowledge	23,149 (23.9)	21,599 (24.3)	1550 (20.1)		16,574 (25.4)	6575 (20.9)	
Mental health training course	20,299 (21.0)	18,783 (21.1)	1516 (19.6)		13,964 (21.4)	6335 (20.1)	<0.001
Psychological assessment	16,031(16.6)	14,580 (16.4)	1451 (18.8)		10,736 (16.4)	5295 (16.8)	
Group building and other development activities	11,071(11.4)	10,210 (11.5)	861 (11.1)		7332 (11.2)	3739 (11.9)	
Psychological salon	6299(6.5)	5728 (6.4)	571 (7.4)		3874 (5.9)	2425 (7.7)	
Others	605(0.6)	550 (0.6)	55 (0.7)		304 (0.5)	301 (1.0)	
Intervention period[a]				<0.001			<0.001
Morning meeting	18,574(29.6)	17,163 (29.8)	1411 (28.4)		12,587 (30.3)	5987 (28.4)	
After work	15,653(25.0)	14,516 (25.2)	1137 (22.9)		10,738 (25.8)	4915 (23.3)	
At weekend	12,750(20.3)	11,752 (20.4)	988 (19.9)		8576 (20.6)	4174 (19.8)	
Lunchtime	7660(12.2)	6936 (12.0)	724 (14.6)		4679 (11.3)	2981 (14.1)	

Dinner time	7316(11.7)	6663 (11.6)	653 (13.1)		4577 (11.0)	2739 (13.0)
Others	703(1.1)	644 (1.1)	59 (1.2)		428 (1.0)	275 (1.3)

[a]Psychological knowledge, psychological interventions, and intervention period were ranked according to the demand of respondents with anxiety and depression symptoms, respectively.

COVID-19, Coronavirus disease 2019.